

## D Summer IGCSE Revision 6

- Simplify  $2 + \frac{3}{5 + \frac{2}{1 - \frac{7}{3 - 2x}}}$ . [Careful about signs]  $\frac{15x+20}{7x+7}$
- If  $f(x) = x^2 + 3x - 2$ , find  $f(2x - 1)$ .  $4x^2 + 2x - 4$
- If  $g(x) = \frac{3}{2x-1}$  find  $gg(x - 1)$ .  $\frac{6x-9}{9-2x}$
- Complete the square for  $x^2 + 8x - 9$ .  $(x + 4)^2 - 25$
  - Hence write down the vertex on the curve for  $y = x^2 + 8x - 9$ .  $(-4, -25)$
- $F$  is proportional to the cube of  $r$ . If  $r = 7$  when  $F = 98$ , find the relationship between the two variables.  $F = \frac{2r^3}{7}$
- If  $y = x + \sqrt{x}$  find the equation of the tangent (in the form  $y = mx + c$ ) when
  - $x = 1$ ,  $y = \frac{3}{2}x + \frac{1}{2}$
  - $x = 4$ ,  $y = \frac{5}{24}x + 1$
  - $x = 2$ . [Fully simplified; no calculators allowed.]  $y = \left(\frac{4+\sqrt{2}}{4}\right)x + \frac{\sqrt{2}}{2}$
- A bag contains 5 yellow, 4 blue and 3 red balls. Three balls are removed at once. Find the probability
  - they are all yellow.  $\frac{1}{22}$
  - they are all different colours.  $\frac{3}{11}$
  - there are two of one colour and one of another.  $\frac{29}{44}$
- In the triangle  $GHI$ ,  $GH = 7$ ,  $GI = 8$  and  $HI = 9$  find angle  $GIH$ .  $48.2^\circ$
- If  $t(x) = x^2 - 2x + 1$ , find the range of  $t(x)$  (by completing the square).  $t(x) \geq 0$
- The gradient between  $(3, 7)$  and  $(5, k)$  is  $m$ . The gradient between  $(3, 7)$  and  $(5, k + 1)$  is  $2m$ . Find  $k$ .  $k = 8$
- $Q$  is inversely proportional to the square root of  $y$ . If  $Q = 10$  when  $y = 49$ , find a relationship between  $Q$  and  $y$ .  $Q = \frac{70}{\sqrt{y}}$
- The length of a race track is 400m (correct to the nearest 10 metres). An athlete can run at 8.1 m/s (correct to 2 sig figs). Find the longest possible time that might be needed for him to run 400m.  $50.31$  seconds
- A die is rolled repeatedly until the sum of the scores of *all* the rolls exceeds 4. Find the probability that it takes
  - exactly two rolls.  $\frac{1}{2}$
  - more than two rolls.  $\frac{1}{6}$
- For  $m(x) = x^2 + 9x - 2$  the domain is  $x < -6$ . Find the range of  $m(x)$ .  $m(x) > -20$
- For  $p(x) = x^2 - 7x + 1$  the domain is  $x > 1$ . Find the range of  $p(x)$ .  $p(x) \geq -\frac{45}{4}$
- The domain for  $k(x) = \tan x$  is  $45 < x < 135$  with  $x \neq 90$ . Find the range of  $k(x)$ .  $k(x) \geq 1$  or  $k(x) \leq -1$

17. A bag contains  $r$  red and 4 blue balls. Two balls are removed from the bag simultaneously. The probability that they are different colours is  $\frac{28}{55}$ . Find the value of  $r$ . [Anyone trying trial and improvement will be summarily shot.]  $r = 7$